

## APPENDIX B

And  
people who  
DON'T.

**pfizer** FOOD SCIENCE



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## **ADDING SWEETNESS, NOT CALORIES.**

For sweetening reduced and low-calorie foods and beverages, Aclame is the wise choice.

With a caloric content of just 1.4kcal per gram and high potency, very little of the product is used. At these small usage levels, Aclame, like other high potency sweeteners, has essentially no impact on the caloric content of foods. When used to sweeten in place of sugar it can help to substantially reduce calories.

## **HIGHLY STABLE, EVEN WHEN THE HEAT IS ON.**

Aclame's unique structure assures excellent stability, effectively minimising potential problems with processing as well as extending shelf-life. Aclame's stability profile enables it to perform exceptionally well, even in foods that require high-temperature conditions such as baking.

Also, by offering superior stability across a broad range of pH levels and processing conditions, Aclame can be used in many different applications.

## **CONSIDER THE LIQUID ASSETS.**

Aclame's excellent solubility in water and other polar solvents makes it an attractive sweetener to use in liquid products such as soft drinks and syrups, especially when the sweetener needs to be added in dry form.

Since Aclame has excellent hydrolytic stability, the quality and level of sweetness in a liquid system are maintained over time.

## **A LITTLE GOES A LONG WAY.**

One of the most important properties in a sweetener is its potency.

Aclame is 2,000 to 3,000 times sweeter than sugar itself. Because this level of potency is so high, you'll use less Aclame to achieve the sweetness you desire. Utilising only a small amount of the product can simplify handling and processing techniques, making Aclame very easy to use.

## **A VERSATILE PERFORMER.**

Aclame delivers superior sweetener performance in everything from confections and baked goods, to ice creams and beverages.

Since the sweetness profile of Aclame is so similar to sugar, Aclame is often used as the sole source of sweetness. However, in those instances when a unique sweetness is desired for a product, Aclame is completely compatible with other high intensity sweeteners.

With so much versatility to offer, Aclame will make it easier for you to develop the kinds of innovative foods today's sophisticated consumers are demanding.

## **ADD THE EXPERIENCE AND EXPERTISE OF PFIZER FOR COMPLETE SATISFACTION.**

Pfizer has a thorough knowledge of food technologies.

We also have considerable product development expertise and resources, with a food technology laboratory in Sydney and access to resources in the United States.

Pfizer also has an excellent portfolio of other high-performance ingredients. These include:

- Lifessee® a one-calorie-per-gram bulking agent which helps maintain the bulking attributes of sugar in sugar-free foods.
- Dairy-Lo® an all natural milk protein which provides creamy texture and mouthfeel in reduced fat foods.
- Veltol® a flavour enhancer that helps round out and balance flavour profiles.

## **OUR KNOWLEDGE AND RESOURCES ARE AT YOUR DISPOSAL.**

If desired, we can use our extensive knowledge and resources to help you develop new low-joule foods.

When you put it all together, there's only one conclusion: Life just got sweeter.

# Potency.

A little goes a *long* way.

Aclame has a level of sweetness that is approximately 2,000 to 3,000 times greater than sucrose at typical usage levels. It depends upon the application and the desired sucrose equivalency.

Compared to other sweeteners in the marketplace, Aclame has a level of sweetness potency that is significantly greater.

| Maximum Sweetness Potency in Water |                             |                    |             |             |
|------------------------------------|-----------------------------|--------------------|-------------|-------------|
|                                    | Potency Frequently Reported | Sucrose Potency at |             |             |
|                                    |                             | 2%                 | 8%          | 10%         |
| Sucrose                            | 1.0                         | 1.0                | 1.0         | 1.0         |
| Acetosulfame-K                     | 200                         | 204                | 77          | 34          |
| <b>Aclame</b>                      | <b>2000</b>                 | <b>4500</b>        | <b>2355</b> | <b>1640</b> |
| Aspartame                          | 200                         | 250                | 143         | 107         |
| Na Cyclamate                       | 30                          | 36                 | 27          | 18          |
| Na Saccharin                       | 300                         | 510                | 188         | 0           |
| Sucralose                          | 600                         | 614                | 520         | 385         |

*Aclame's sweetness potency greatly exceeds that of other sweeteners.*

## SUGGESTED USAGE LEVELS OF ACLAME.

A single kilogram of Aclame provides the sweetening potency of between 2 metric tons and 3 metric tons of sugar. Typically, usage levels for Aclame range from 20 to 200ppm.

Alitame is a crystalline, non-hygroscopic dipeptide-based sweetener with a unique

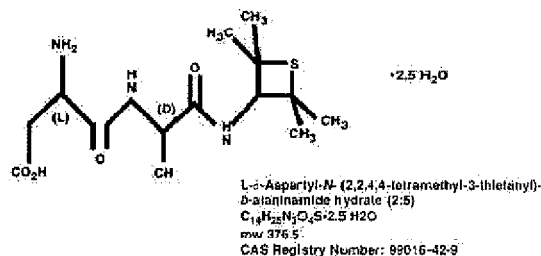
| Aclame Suggested Usage Levels |                 |                 |                         |                 |                 |
|-------------------------------|-----------------|-----------------|-------------------------|-----------------|-----------------|
| Application                   | Use Level (ppm) | Sucrose Matched | Application             | Use Level (ppm) | Sucrose Matched |
| <b>Soft drinks:</b>           |                 |                 | Flavored yogurt         | 20 - 30         | 5-10%           |
| Coke                          | 40 - 45         | 10%             | Custard                 | 10 - 15         | 5-10%           |
| Raspberry                     | 45 - 50         | 11%             | <b>Baked Goods:</b>     |                 |                 |
| Orange                        | 45 - 50         | 12%             | Muffin                  | 80 - 100        | 15-20%          |
| <b>Cordial:</b>               |                 |                 | Cake                    | 100 - 150       | 20-25%          |
| Fruit                         | 35 - 35         | 9%              | <b>Other:</b>           |                 |                 |
| No. 20                        | 35 - 40         | 9.5%            | Tabletop sweetener      | 1 - 2           | (10 ppm) 4-4g   |
| <b>Dairy:</b>                 |                 |                 | Fruit fruit (preserves) | 50 - 60         | 45% 60%         |
| Ice Cream                     | 50 - 70         | 16%             | Jelly                   | 55 - 65         | 10%             |
| Flavored milk                 | 10 - 15         | 4%              | Guar gum (thick)        | 100 - 200       | 32%             |
| Fruit (apple) (apple)         | 20 - 30         | 7.5%            | Chocolate coating       | 80 - 70         | 42%             |

*Due to its high sweetness levels, Aclame can be used in small quantities to achieve desired sweetness.*

structure that enables high levels of sweetness and stability.

It is a member of the L- $\alpha$ -Aspartyl-D-alanine amide series discovered by Pfizer Food Science in which the alanine carboxyl group is terminated as an amide of a novel amine (2,2,4,4-tetramethylthietanyl amine).

## ALITAME STRUCTURE.



*Alitame is a crystalline, non-hygroscopic powder—its unique structure enables high levels of sweetness and stability.*

# Solubility.

## Consider the *liquid* assets.

Due to Aclame's excellent solubility in most polar solvents, the sweetness of the product can be added as a solution or neat material.

### ACLAME SOLUBILITY.

| Solvent          | Solubility (%W/V), 25°C   |
|------------------|---------------------------|
| Water            | 13.1 (isoelectric pH 5.6) |
| Methanol         | 41.9                      |
| Ethanol          | 61.0                      |
| Propylene glycol | >40                       |
| Chloroform       | 0.02                      |
| n-Heptane        | 0.001                     |

*Due to its outstanding solubility, Aclame is easy to process in solution and can be used in an extensive range of foods.*

Aclame can be added to the food system from a stock solution or as the dry material dissolved in available liquids from the formulation.

At Aclame's isoelectric point of pH 5.6, it is 13.1% soluble in water (w/v) at 25°C. Aclame is equally soluble in most liquid systems encountered in food applications.

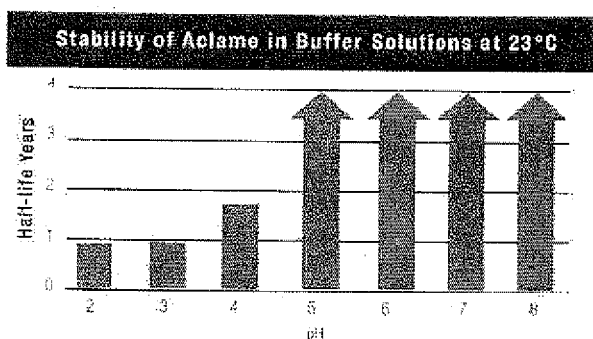
The exceptional stability of Aclame in solution, even at high temperatures, facilitates usage and processing of the product—making Aclame a very versatile sweetener for many different kinds of foods such as low calorie beverages and syrups.

# Stability.

## Highly stable, *even* when the HEAT is on.

The unique structure of Aclame allows the product to deliver maximum stability across a wide range of pH levels and under many different food processing conditions.

This effectively reduces the potential for processing conflicts, while also increasing ease of use and extension of shelf life.



\*Aclame half-life of 0.5 to 1.0 years at 23°C is equivalent to half-life at elevated temperatures due to the graphic scale of years.

**Aclame offers excellent stability over a wide pH range, including lower pH aqueous systems.**

Aclame is also very stable in aqueous environments. This provides the opportunity to use Aclame in a greater variety of foods

including pasteurized processed and high temperature processed neutral pH food systems as well as confectionery and baked goods.

Additionally, Aclame offers excellent stability in lower pH aqueous systems.

At elevated temperatures, Aclame solutions of varying pH levels show good hydrolytic stability. Thus, Aclame provides thermal stability when thermal processing is warranted.

| Elevated Temperature Stability of Aclame |       |      |      |
|------------------------------------------|-------|------|------|
| 100°C                                    | 13.5* | 13.4 | 12.6 |
| 115°C                                    | 2.1*  | 2.1  | 2.1  |
| <small>*Half-life in hours.</small>      |       |      |      |

**Concentrated Aclame solutions provide excellent stability when held at elevated temperatures.**

These high levels of stability give food technologists extensive versatility in developing foods that will meet the diversified needs of today's consumers.

# Taste.

## Adding *sweetness*, not calories.

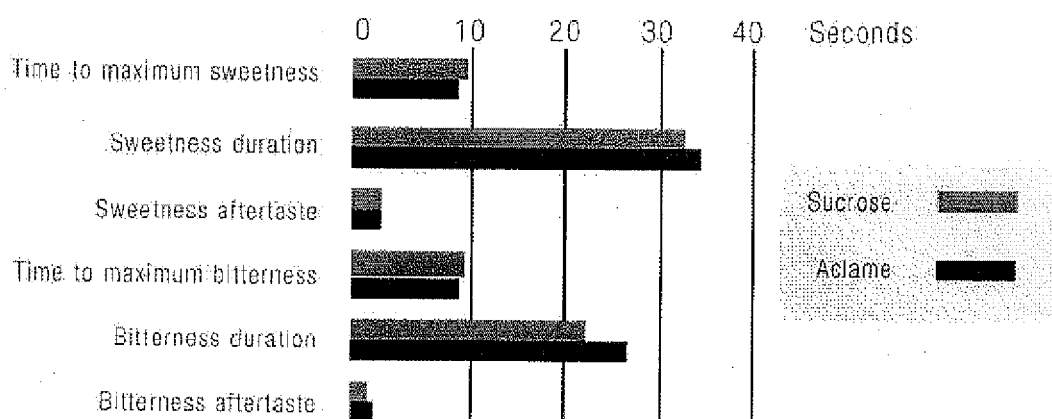
Sensory analysis indicates that Aclame's sweetness profile is similar to that of sugar. As a result of its unique composition, the product delivers a clean sweetness closely resembling the actual sweetness of sugar. When tested in water versus a 10% sucrose equivalent, Aclame performed exceedingly well, providing a very high level of sweetness potency.

The product's outstanding performance characteristics give it excellent versatility, allowing Aclame to be used alone or blended with other sweeteners to create the flavour profile and sweetness adaptations that are right for you.

Aclame has a caloric content of just 1.4 kcal (5.85 joules) per gram. And because of the product's exceptional potency, only small amounts are necessary to achieve desired sweetness.

Thus, while Aclame itself has essentially no impact on the caloric content of foods, when used as a replacement for sugar it can significantly reduce calories.

### SWEETNESS AND BITTERNESS IN WATER AT 10% SUCROSE EQUIVALENCY.



*Aclame has a sweetness and flavour profile similar to sugar.*

## ACLAME MAXIMUM STABILITY.

| Maximum Stability in Various Applications |                      |                                             |          |
|-------------------------------------------|----------------------|---------------------------------------------|----------|
| Product                                   | Process              | Conditions                                  | Aclame   |
| Water, unbuffered                         | HTST                 | pH 3-5.5                                    | >97%     |
| Water, buffered                           | Batch                | pH 3-7                                      | >98%     |
| Tablets                                   | Pasteurization       | 23°C and 37°C<br>x 2 years                  | Avg. 91% |
| Granulated Blends                         | Maltodextrin Carrier | 23°C and 37°C<br>x 2 years                  | Avg. 88% |
| 3% Solution                               | Water Carrier        | 23°C and 30°C<br>x 2 years                  | >91%     |
| Yellow Cake                               | Conventional Baking  | 350°F.<br>x 35 min.                         | >75%     |
| Cookies                                   | Conventional Baking  | 375°F.<br>x 9 min.                          | >75%     |
| Frozen Yogurt                             | HTST                 | 180°F x 30 sec.                             | 95%      |
| Sugar Free Hard Candy                     | Batch Depositing     | Addition with<br>flavour and acid           | 85%      |
| Leimon-Lime Soda                          | Conventional Process | 23°C x 1 year<br>and 30°C x 25 weeks pH 2.5 | >70%     |

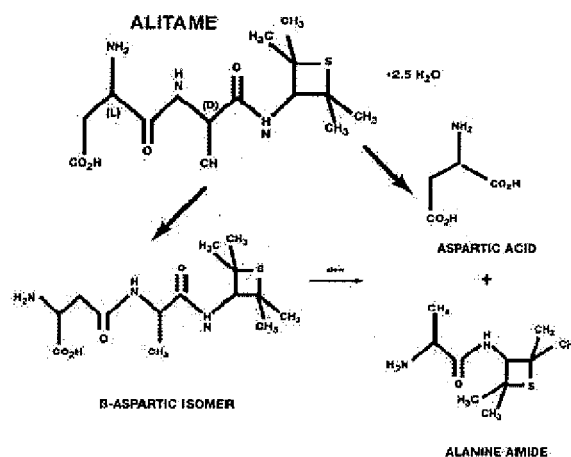
High levels of stability ensure that Aclame is adaptable to a wide variety of food processing applications.

Although Aclame has good stability some hydrolysis and isomerization can occur.

The major pathway involves hydrolysis of the aspartylalanine dipeptide bond to give aspartic acid and alanyl-2,2,4,4-tetramethylthietane amide ("alanine amide"). The aspartic rearrangement common to all peptides bearing terminal aspartic acid, also occurs to give the aspartic isomer of Aclame.

This rearranged dipeptide hydrolyzes at a slower rate than Aclame to give the same product as those arising from the parent compound. No cyclization to diketopiperazine or hydrolysis of the alanine amide bond is detectable in solutions of Aclame that have undergone up to 90% hydrolysis. All three major products of hydrolysis and isomerization are completely tasteless at levels that are possible in foods.

## ACLAME HYDROLYSIS AND ISOMERIZATION.



A minimal amount of hydrolysis and isomerization may occur in Aclame when used in some applications. However, this has no impact on taste.